OUTDOOR EDUCATION AND INTERDISCIPLINARITY: A CONNECTION BETWEEN SCIENCE AND MOTHER TONGUE

Carolina Gonçalves* and António Almeida**

** Instituto Politécnico de Lisboa, Escola Superior de Educação de Lisboa, Centro Interdisciplinar de Estudos Educacionais; Centro Interdisciplinar de Ciências Sociais CICS.NOVA - Faculdade de Ciências Sociais e Humanas - Universidade Nova de Lisboa (CICS.NOVA.FCSH/UNL); ** Instituto Politécnico de Lisboa, Escola Superior de Educação de Lisboa; Centro Interdisciplinar de Estudos Educacionais; Centro de Investigação em Didática e Tecnologia na Formação de Formadores, University of Aveiro (Portugal).*

Abstract

The study plans of the courses for Primary School Teachers in the Lisbon Higher School of Education include a curricular unit designed "Projects of Curricular Integration between Science and Mother Tongue". Their main goal is to develop interdisciplinarity reflection, discussion and didactic proposals between these two subjects. In the final session of the unit, in the last two school years, a questionnaire about interdisciplinarity was administered to the 37 students that chose it, in order to identify, among other aspects, the advantages and potentialities of this type of knowledge articulation. Fourteen educational resources designed by the students to explore Nacional Tapada of Mafra were also analyzed. The results showed that the majority of the students tend to emphasize the importance of interdisciplinarity in promoting meaningful learning and in the perception that knowledge is interconnected. Concerning the educational resources, the students explore mainly scientific vocabulary and the use of description and expository text, regularly used in outdoor tasks.

Keywords: Interdisciplinarity, Mother tongue, Science, Higher education.

Resumen

El plan de estudios de la titulación de Maestro en Educación Primaria de la Escuela Superior de Educación de Lisboa incluye una unidad curricular llamada “Proyectos de integración curricular entre ciencia y lengua materna”. Su principal objetivo es

desarrollar una reflexión interdisciplinar, discusión y propuestas didácticas entre estas dos materias. En la sesión final de esta unidad, durante los dos últimos cursos académicos, se administró un cuestionario sobre interdisciplinariedad a 37 estudiantes que eligieron cursar esta unidad curricular, con el objetivo de identificar, entre otros aspectos, las ventajas y las potencialidades de este tipo de articulación del conocimiento. Los estudiantes que cursaron la unidad curricular diseñaron un total de catorce actividades para explorar la Tapada Nacional de Mafra. Los resultados revelaron que la mayoría de los estudiantes tienden a enfatizar la importancia de la interdisciplinariedad para promover el aprendizaje significativo y la percepción sobre la interconexión del conocimiento. En los recursos educativos, los estudiantes exploraron fundamentalmente vocabulario científico y el uso de la descripción y del texto expositivo, frecuentemente empleados en tareas al aire libre.

Palabras clave: Interdisciplinariedad, Lengua materna, Ciencia, Educación superior.

Introduction

Since the end of the eighteenth century, the exponential increase of knowledge has led to a process of its fragmentation, increasing the number of scientific disciplines and their level of abstraction (Gusdorf, 1990). School has been following this trend of fragmentation and several new disciplines have been introduced on the curricula through time.

Several questions arise as the specialization of knowledge advances. Pombo, Guimarães, & Levy, (1993) points out that it becomes increasingly difficult to find answers to the new and complex issues faced by the world. And in school, the lack of articulation among subjects prevents a more holistic construction of knowledge, making it difficult to transfer ideas and concepts addressed in different subjects. Thus, the emergence of interdisciplinarity has been placed in schools as a necessity that allows to complement school subjects, to recover the concrete sense of things (Fazenda, 2008) and to make the curriculum more relevant for students (Jacobs, 1989).

In Portugal, in the context of the 1st cycle of primary school, the curriculum is organized around a set of areas: Mother Tongue, Mathematics, Study of the Environment, Artistic Expressions and Physical Education. Although this cycle is

ensured by a single teacher, curricular fragmentation is frequent due to the existence of separate moments for each area in the week schedule.

As a result of this situation, the Lisbon Higher School of Education has sought to promote interdisciplinary approaches inside its courses. A good example was the creation of the Master's Course in "Integrated Didactics in Mother Tongue, Maths, Science and Social Sciences, an innovative course in the Portuguese Context (see, Gonçalves, Almeida, Rodrigues, & Dias, 2015, for knowing its structure). But other initiatives can be cited, as the creation of the curricular unit called "Projects of Curricular Integration between Science and Mother Tongue" in the study plans of the courses that prepare teachers for Primary School.

Scientific knowledge has revealed a big potential to aggregate other areas of knowledge (Almeida, 2007). Stevens (2011) emphasizes the role of language in interdisciplinary approaches through literature, linguistics or thematic exploration. Thus, this unit articulates two areas of knowledge with an enormous interdisciplinary potential and intends to be a space for research, reflection and systematic debate on the identification of methodologies, working tools and contents which allow the development of integrated work proposals to be developed with pupils of the first six years of schooling. In this unit, among the topics of the syllabus, is discussed how language and science can be covered in the context of experimental work and outdoor activities.

Method

The aim of this study was to identify the advantages derived from the existence of the curricular unit mentioned above. For this purpose, a questionnaire was built, with open questions to identify and analyze (i) the disciplines students consider more favorable to interdisciplinarity; (ii) the potentialities for the promotion of interdisciplinarity; (iii) the potentialities for the interdisciplinarity between Science and Mother Tongue.

The instrument was administered to 37 students (35 females), with an average age of 23.6 years, attending the unit in the two school years of 2016/2017 and 2017/2018.

The data were analyzed in a qualitative way and the answers were subject to content analysis and later categorization. After this process, the absolute and relative frequency of the responses included in each category was calculated.

Fourteen productions of the students (educational resources for primary students) were also analyzed, regarding the didactic exploration of the National Tapada of Mafra. This analysis intended to check the potential of outdoor activities in the field of the articulation between Mother Tongue and Science.

Results

When questioned about the subjects which can facilitate interdisciplinarity, 23 (62,1%) of the students considered that all can have this role. Of the 14 (37.9%) students who highlighted concrete subjects, four mentioned two possibilities of articulation. Thus, six (14.6%) identified the articulation between Mother Tongue and Science; four (9.8%) highlighted Mother Tongue as an enhancer of interdisciplinarity; and three (7.3%) the articulation between Mother Tongue and History and Geography. The remaining subjects or articulations of subjects were: Mother Tongue and Drama; Science and Mathematics; History and Geography; Science; Mother Tongue and Mathematics, all mentioned by only one student (Table 1).

Table 1

Articulations between subjects which facilitate an interdisciplinary approach mentioned by the students.

	n	**%**
All subjects can promote interdisciplinarity	23	62.1
Mother Tongue and Science	6	14.6
Mother Tongue	4	9.8
Mother Tongue, History and Geography	3	7.3
Mother Tongue and Drama	1	2.4
Since and Maths	1	2.4
History and Geography	1	2.4
Science	1	2.4
Mother Tongue and Maths	1	2.4

[a] Four students report two pairs of subjects, so the number of responses exceeds the number of the sample.

The potential of interdisciplinarity (Table 2) is essentially centered on fostering an integrative and meaningful approach to knowledge (16 - 33.3%). Other students also mentioned that "it helps to outline concepts and knowledge" (9 - 18.3%). Other aspects highlighted the contribution of Mother Tongue to interdisciplinarity, such as its contribution to the "understanding of scientific texts" (7 - 14.6%) and to the "elaboration of textual genres of science" (7 - 14.6%), as is the case of reports, and expository, argumentative and instructional texts. They also stated it will be "easier to learn scientific language" (4 - 8.3%) and "others" (5 - 10.4%), which include potentialities as "motivation for learning", "better time management" and “helping outdoor activities".

Table 2

Potentialities of interdisciplinary highlighted by the students.

	N	***%***
Integrative and meaningful approach to knowledge	*16*	*33,3*
Helping to outline concepts and knowledge	*9*	*18,8*
Understanding of scientific texts	*7*	*14,6*
Elaboration of textual genres of science	*7*	*14,6*
Facilities to learn scientific language	*4*	*8,3*
Others	*5*	*10,4*

[a] 11 students pointed out more than one potentiality.

It was also intended to check the advantages of an interdisciplinarity approach between Mother tongue and Science, since this articulation was the focus of the curricular unit (Table 3). Thus, 21 (26.9%) students considered that the interdisciplinary involving these two subjects can develop "different perspectives of daily situations”. Other students considered that it can be an "easier way for learning concepts and problem solving" (15 - 19.2%). Another advantage mentioned was the promotion of a better "knowledge integration" (12 - 15.4%). The development of a "significant and global learning" (9 - 11.5%),” the promotion of knowledge acquisition" (8 - 10.3%) or "the promotion of motivation and interest" (5 - 6.4%) were other advantages added. In addition, other advantages included the promotion of cooperative work, the

development of critical thinking, the teaching of content in less time, and to allow a lifelong learning (8 – 10.3%).

Table 3

Advantages of interdisciplinarity between mother tongue and science.

	n	%
Different perspectives of daily situations	21	26,9
Learning of the concepts and problema solving	15	19,2
Knowledge integration	12	15,4
Learning in a more holistic and significant way	9	11,5
Aquisition of knowlege	8	10,3
Motivation and interest	5	6,4
Others	8	10,3

[a]All the students listed more than one advantage.

After the analysis of the educational resources, it was possible to check that, at the level of language learning, the performance descriptors most mobilized by the students were the exploration of the specific vocabulary, which gains a scientific character in the context of science, as well as the exploration of textual genres that best fit the work with this area of knowledge, namely the news, the description and the expository text, regularly used in outdoor tasks. Research and information recording were also descriptors used for preparatory tasks, which help primary students in knowledge building.

Discussion/Conclusions

The present study is a contribution to assess the curricular unit "Projects of Curricular Integration between Since and Mother Tongue". The students who attended it could enumerate a set of advantages associated to an interdisciplinary practice, in general, and to the articulation between Science and Mother Tongue, in particular. Nevertheless, the majority of the students expressed the idea that interdisciplinarity can be fostered among any areas of knowledge, which shows that students were not particularly conditioned or influenced by the articulation developed in the unit. The outdoor contexts seem to be effective for the articulation between Mother Tongue and Science, since students were able to use contents of both areas of knowledge in the design of educational resources.

References

Almeida, A. (2007). Que papel para as Ciências da Natureza em Educação Ambiental? In J. B. Lopes & J. P. Cravino (Org.), *Contributos para a Qualidade Educativa no Ensino das Ciências do Pré-Escolar ao Superior. Atas do XII Encontro Nacional de Educação em Ciências* (pp. 125-132). Vila Real: UTAD.

Gonçalves, C., Almeida, A., Rodrigues, M., & Dias, A. (2015). Integrated Didactics: an example of a curriculum model enhancing knowledge crossing. In L. Gómez Chova, A. López Martínez, I. Candel Torres (Edit.), *8th ICERI: International Congress of Education, Research and Innovation* (pp. 8118-8125). Seville: IATED

Fazenda, I. (2008). *Didática e Interdisciplinaridade*. São Paulo: Papirus Editora.

Gusdorf, G. (1990). O conhecimento interdisciplinary. In H. Guimarães, O. Pombo, T. Levy (Org.). *Antologia I*. Lisboa: Projecto Mathesis.

Jacobs, H. (1989). The Growing Need for Interdisciplinary Curriculum Content. In H. Jacobs (Edit). *Interdisciplinary Curriculum. Design and Implementation* (pp. 1-13). Alexandria (VA): ASCD.

Pombo, O., Guimarães, H., & Levy, T. (1993). *A Interdisciplinaridade. Reflexão e experiência*. Lisboa: Texto Editora.

Stevens, D. (2011). *Cross-Curricular Teaching and learning in the Secondary School. The centrality of Language in learning*. London: Routledge.